

MASTER OF SCIENCE
in Information Science
& Technology

(MS in IS & T)

Student Guidebook

**Department of Computer and Information Sciences
College of Science and Technology**

Temple University



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General Description

The MS in IS&T program is intended to provide students with an advanced knowledge in the technology of developing information systems across a variety of applications settings. Students will develop the skills and knowledge necessary to analyze and understand problems in different applications domains and apply current technology to help solve these problems.

The program is designed primarily for 3 types of students: 1) students and practitioners with an undergraduate degree in Information Science and Technology (IS&T), Computer Science or the equivalent; 2) students and practitioners with an undergraduate degree in a different field interested in switching into the IS&T; and 3) students in Temple's special Accelerated (4+1) Bachelors-Masters Program. Students entering the MS in IS&T program without a CS/IS&T degree or equivalent knowledge in computing technology will be asked to take additional course work (described in a special section on Prerequisite Studies, below) before continuing on to graduate studies.

The program requires a total of 27 credits selected from the four Core courses, 4 electives, and a capstone course. The emphasis throughout is on the development of problem solving and communications skills, and the use of advanced software systems, networks, and database technologies to aid in understanding scientific, mathematical, financial, economic, social, and artistic phenomena, to model and simulate real-world processes and structures, and to redefine and improve organizational and engineering processes and develop computerized systems to support these processes.

Students learn through a combination of concept-oriented class work and substantial laboratory work. They participate individually and in groups in the design, development, testing, and documentation of computer systems combining hardware components and customized software. They learn how to analyze needs and design and build systems to meet these needs.

Program Structure and Degree Requirements

The MS IS&T Program is made up of Core courses, Advanced Topics, and a one-semester Capstone Project course. Core courses include topics in IT Process Management, System Development, Computer and Systems Security and Privacy, and Enterprise Management Tools. Advanced topics currently include studies in system and network technologies and administration, database technologies (including warehousing, filtering, and mining) and administration, security and privacy, ethics, legal issues and forensics, networks and operating systems, knowledge management and data mining, enterprise resource planning, networked and web application systems. [Summary information concerning these courses may be found in Appendix A of this document. More complete course descriptions may be found at the department web site at www.temple.edu/cis]. Our goal is to ensure that each graduate is well grounded in the use of these technologies and the understanding of their underlying concepts. The final course is a required one-semester Capstone Project course which is designed to help students integrate what they have learned throughout this Program and apply this knowledge in the design and implementation of a software application.

A total of nine (9) graduate courses (27 credits at the 5100-level and above) are required for the degree: 4 Core CIS courses, CIS 5105, 5106, 5107 and 5108; 4 advanced topics (elective) courses and one capstone project course round out the required set of courses. A maximum of three electives may be taken outside CIS with the approval of the MS in IS&T Program Director. Students with an applied interest are encouraged to substitute a 2 or 3 course cluster in their interest areas, provided they meet the prerequisites for these courses.

Requirements for the Accelerated (4+1) Bachelors-Masters Degree (ABMD) Program or the Dual Bachelors-Masters Degree Program (DBMD)

1. (NEW 11-12-2010) The ABMD program is intended for students who are on track to meet the BA or BS degree requirements within one year of the date of entry to the ABMD program. Such students may take up to three MS in IS&T courses during the last three semesters of undergraduate studies and credit them toward both the BA/BS and MS in IS&T programs. Additional details may be found in the ABMD program announcement in Appendix B at the end of this document, or by contacting the MS in IS&T Program Coordinator, listed at the end of this document (in front of the Appendixes).

2. Participation in a Dual Bachelors-Masters Degree (DBMD) program by computer and information sciences majors attending other colleges and universities in the United States is currently possible only with prior written agreement between Temple and the student's host institution. Discussion pursuant to the conclusion of such agreements are underway with several institutions in the Philadelphia area, but none have been completed as of this date. Non-Temple students interested in the DBMD program are urged to consult with their advisor. Additional details may be obtained by contacting the CIS Academic Programs Coordinator or the MS in IS&T Program Coordinator.
3. Participation in the DBMD degree program by computer and information sciences majors attending colleges and universities outside the United States is currently possible only with prior written agreement between Temple and the student's host institution. Further information may be obtained by visiting the web site

<http://www.temple.edu/cst/dbmd/>

or by contacting the Dual Bachelor's - Master's Degree Program Office listed at the end of this document.

Prerequisite Studies

Prerequisite background normally should include studies, or practical experience, in such fundamental IS&T areas as programming concepts, object-oriented modeling, database systems, software systems analysis and design, computer operating systems and architectures, networks and communications, and web-centric computing. Students without Computer Science (CS) or related degrees who meet the prerequisite requirements (below) can also qualify. Students entering the MS in IS&T program without a CS/IS&T degree or equivalent knowledge in computing technology will be required to make up some or all of these deficiencies. The CIS Department provides courses that can be of help in this effort. The list of courses is summarized below. More details are provided in Appendix A.

Bridge Courses –

Students must have an ability to program in a block structured programming language such as Pascal, C, Ada, C++, Java, or Visual Basic. The equivalent of two semesters of programming in a language supporting the object-oriented paradigm is strongly advised. Students must satisfy this requirement before taking any graduate courses in the MS in IS&T program. The requirement may be satisfied by taking courses at Temple (CIS 1073 and 2173) or at any two or four year institution. No graduate credit is given for these courses. Consultation with the CIS MS in IS&T Program Director prior to enrollment in courses offered outside Temple is strongly advised. A grade of B or better is required regardless of where the course is taken.

Foundation Level Courses

Students are required to have a solid background in each of the following areas:

- Advanced programming and component-based software design
- Database Technology
- Networking and Operating Systems

Students deficient in one or more of these foundation areas of information science and technology are required to make up these deficiencies before take MS in IS&T degree courses. To assist in this work, the CIS Department offers three Foundation courses, CIS 5001, 5002, and 5003, as shown in Table 1 below. Students enrolling in these course must have satisfied the Bridge level requirement. Placement out of these courses is possible through a variety of means. Such placement must be approved by the MS in IS&T Program Director. Graduate credit is given for Foundation Courses, although these credits may not be used toward the 27 credits required for the MS in IS&T degree. More details on these courses may be found in Appendix A.

Table 1: Foundation Courses

	General Content	Course Composition
1	Object-oriented component-based software design with database and client-server programming	5001: Component-Based Application Programming This course is roughly the equivalent of CIS 3309 with additional material added
2	Database management and applications	5002: Database Design and Programming This course the equivalent of CIS 2109 and 4362
3	Networking and Operating Systems	5003: Networking and Operating Systems This course is the equivalent of CIS 3229 and 4329

Who Should Apply

The MS in IS&T Program is targeted for students from all types of organizations and knowledge backgrounds. It should be of interest to established employees in the computing and IT fields desiring to upgrade their skills, as well as professionals in other fields seeking a career change. This latter group of students normally will have an undergraduate degree in a non-CIS field and will require more extensive training in order to change to a career in information systems or information systems applications (see the section on Prerequisite Studies, above).

Graduates of IS&T, CS, or related programs are encouraged to apply. Temple IS&T or CS majors may also be interested in enrolling in the 4+1 program of study leading to both Master's and Bachelor's degrees in 5 years (as opposed to the normal 5 ½ or six year program). Students from other colleges and universities in the U. S. or abroad, may wish to do the same, provided they meet the appropriate set of prerequisites for their first three years of study. The department and college also encourage the development of special interdisciplinary programs of study for students pursuing graduate study in the sciences, business, or other disciplines who wish to develop a graduate background in information science and technology.

Admission Requirements

To be admitted to the MS in IS&T Program (without additional course-work), students must normally meet the following admission standards:

- A IS&T or CS baccalaureate degree from an accredited institution.
- An undergraduate GPA of at least 3.0.
- A statement of goals of approximately 500-1,000 words (should include the following elements: your specific interest in Temple's program; your research goals; your future career goals; and your academic and professional achievements)
- Up-to-date resume.
- GRE or GMAT scores of at least the 65th percentile on the quantitative section and at least in the 25th percentile on the verbal section. Most students submit scores far above the minimums in each of the Verbal and Quantitative sections.
- TOEFL scores for international applicants of 550 (paper-based), 213 (computer-based), or 79 (internet-based)
- A score of 45 or greater on the Test of Spoken English (TSE) or a score of 28 or greater on the TOEFL iBT Speaking Score is required for international applicants who wish to be considered for a Graduate Teaching Assistantship.
- A minimal background of:
 - a) 2 consecutive programming courses in the same language (such as CIS 1073 or 2173);
 - b) database courses (such as CIS 2109 and 4362);
 - c) courses in computer operating systems and networking (such as CIS 3229 and 4329);
 - d) courses in component-based (object-oriented) software design (such as CIS 3309 and 4342) including at least some introduction to client-server systems design.This background may be satisfied by equivalent courses or relevant work experience. The content of the undergraduate courses may be found on the CIS Department website at <http://www.temple.edu/cis> (See the links Undergraduate → Undergraduate IS&T)
- At least two letters of recommendation from information science and technology or computer science faculty or professionals in the field. When appropriate, letters from faculty or professionals in other fields may be substituted.

Admission to the program is administered by the CIS Department MS in IS&T Program Director. Applicant backgrounds in IS&T are reviewed to determine a plan of study that is most suitable for each student and to identify needed pre-requisites (if any).

Application Deadline:

Fall: December 15th

Spring: August 1st

Applications are reviewed as they are received up through the deadline. Applications received after these dates may also be considered.

Transfer Credit

Graduate-level IS&T or CS coursework obtained no more than five years prior to the student's matriculation in the graduate program may be transferred into the CIS program. The student must have earned a "A" in the course, and must submit a rationale for applying the credits to the current graduate program. The maximum number of credits a student may transfer is 6.

Program Contact Information:

www.temple.edu/cis

Department Information:

Dept. of Computer and Information Sciences
Wachman Hall, 3rd Floor (038-24)
1805 N. Broad Street
Philadelphia, PA 19122
cisadmit@temple.edu
215-204-8450

Department Contacts:

Academic Programs Coordinator:
Jacalyn Harriz
harriz@temple.edu
215-204-1614

MS in IS&T Program Coordinator:
Frank Friedman
friedman@temple.edu
215-204-5559

College of Science and Technology Contacts (DBMD only):

Dual Bachelor's - Master's Degree Program Office
Dual Bachelor's - Master's Degree Program
Office of The Dean, Suite 400, Carnell Hall
1803 N. Broad Street Philadelphia, PA 19122, USA
Phone: 215-204-5759 | Fax: 215-204-1255 | Email: dbmd@temple.edu

Appendix A – MS in IS&T Graduate Course Descriptions

For more complete course descriptions as well as descriptions of referenced undergraduate courses, please see the CIS Department website at www.temple.edu/cis/.

CIS 5001: Component-Based Application Programming (3 s. h.) F S

This course is the equivalent of CIS 3309 (as described on the CIS Department website) but with additional review at the beginning and more intensive database and client-server applications at the end. Prerequisites: Two semesters of programming in an object-oriented language. This course may be taken for graduate credit but it cannot be counted toward the 27 credit MS in IS&T degree requirement.)

The course emphasizes component-based application programming using the Microsoft Visual Studio Integrated Development Environment (IDE). Students will learn (and practice using) the VB .NET programming language, object-oriented software design techniques, and the principles of good user interface design. Topics include building quality software, including user interfaces to databases (using ADO.NET), sequential files, and graphics tools. Object-oriented concepts such as inheritance, polymorphism, static and dynamic binding, and interface (abstract class) components will be covered. The use of ASP.NET for client-server systems development is also elaborated.

CIS 5002: Database Design and Programming (3 s. h.) F S

(This course is the equivalent of CIS 2109 and 4362, as described on the CIS Department website. Prerequisites: Two semesters of programming in an object-oriented language. This course may be taken for graduate credit but it cannot be counted toward the 27 credit MS in IS&T degree requirement.)

This course provides an in-depth understanding of the modeling, design and implementation of database systems. Students develop an appreciation of the role of data, files and databases in information systems, gain an understanding of database development activities as part of the System Development Life Cycle (SDLC), and become familiar with data modelling concepts. Students are expected to be able to create databases and pose complex SQL queries of relational databases using Oracle and Microsoft Access. Topics include the relational model, E-R and Class Diagrams, normalization, advanced SQL, Oracle Enterprise system transaction processing, concurrency control, and recovery. Also covered are aspects of database administration, data integrity, security and authorization, stored procedures and triggers, the embedding of SQL in procedural languages and scripting languages, multi-tiered architectures, middleware, ODBC web-based databases, and web application integration. Students work in teams to implement large scale information system using a DBMS. CASE tools are used for data modeling.

CIS 5003: Networking and Operating Systems (3 s. h.) F S

(This course is the equivalent of CIS 3229 and 4329, as described on the CIS Department website.

Prerequisites: Two semesters of programming in an object-oriented language. This course may be taken for graduate credit but it cannot be counted toward the 27 credit MS in IS&T degree requirement.)

This course covers the essentials of operating systems and computer networks. Topics include: the processor, data and program representation, computer memory systems, software system support for I/O including support for networking, and a thorough introduction to the TCP/IP protocol suite.

CIS 5105: IT Process Management (3 s.h.) F S

Prerequisite: Equivalent background of the CIS IS&T undergraduate program.

An introduction to essential techniques for successfully creating, organizing and managing IT projects. The course provides the foundation for more advanced studies in process management and software engineering. Enterprise-wide requirements, long-range planning and managing all aspects of the development process will be emphasized. The course will stress the use of appropriate software tools and process modeling throughout the development lifecycle. Quality assurance techniques are introduced at the outset to guide IT processes and decision making.

CIS 5106: System Development Process (3 s.h.) F S

Prerequisite: Equivalent background of the CIS IS&T undergraduate program.

Methods and tools for the technical development of IT systems are presented and used in case projects. The course follows the normal development lifecycle, starting with the recognition and justification of the need for either a new system or an upgrade to an existing system. It then proceeds through analysis, specification, design, implementation, testing (quality assurance), client training and turnover, and maintenance. The importance of each development stage will be taught within the framework of systems reliability, effectiveness, security, scalability, and development cost.

CIS 5107: Computer Systems Security and Privacy (3 s. h.) F S

Prerequisite: Equivalent background of the CIS IS&T undergraduate program.

Computer systems security and information privacy has become a critical area of computer science development and research. This course involves an analysis of the technical difficulties of producing secure computer information systems that provide guaranteed controlled sharing and privacy. Emphasis is on software modeling and design to better ensure the protection of resources (including data and programs) from accidental or malicious modification, destruction, or disclosure. Current systems and methods will be examined and critiqued. The possible certification of such systems will also be investigated.

CIS 5108: Emerging Technologies and Tools for Enterprise Management (3 s.h.) F S

Prerequisite: Equivalent background of the CIS IS&T undergraduate program.

The purpose of this course is to provide students with an understanding of maturing and emerging technologies and their likely impact on the networked information paradigm and enterprise management. Both hardware and software technologies will be covered. Students will be introduced to advanced software tools that demonstrate how agency enterprises make use of vast information flows and interconnectivity.

CIS 8108: Knowledge Management (3 s.h.) F S

Prerequisites: Satisfactory completion of the MS in IS & T Core, CIS 5105-07.

Principles of knowledge management (KM) and their use in locating, evaluating, disseminating, and using information and knowledge. Application of these principles and techniques. Knowledge management incorporates data acquisition, information integrity, and management of knowledge and is crucial to everyone working in any field where information is stored, processed, and used. It places a premium on an IT-intensive organization to invest, cultivate, and fully utilize the intellect and knowledge of all staff.

CIS 8110: Seminar in Information Science and Technology (3 s.h.) F S

Prerequisites: The MS in IS&T Core, CIS 5105-07.

An intermediate level graduate special topics course in current and emerging developments in information systems and technology.

CIS 8501: Advanced Database Systems – Development and Management (3 s.h.) F S

Prerequisites: Satisfactory completion of the MS in IS & T Core courses, CIS 5105-07.

This course provides an in-depth understanding of the modeling, design and implementation of database systems. Topics include the relational model, E-R Diagramming and Class Diagrams, normalization, advanced SQL, Oracle Enterprise system transaction processing, concurrency control, and recovery. Also covered are aspects of database administration, security and authorization, stored procedures and triggers, the embedding of SQL in procedural languages and scripting languages, multi-tiered architectures, middleware, ODBC web-based databases, and web application integration. Students work in teams to implement large scale information system using a DBMS. CASE tools are used for data modeling.

CIS 8503 Usability Engineering (3 s.h.) F S

Prerequisites: Satisfactory completion of the MS in IS & T Core courses, CIS 5105-07.

This course focuses on the principles of usability engineering to design effective interfaces. In parallel with functional specification development, usability engineering identifies the usability specifications of the system, which includes information and interface design. In some modern day information systems, usability can be paramount and require as much or more effort and programming as functional requirements, i.e., information systems may provide relevant functionality, but if the system is not easy to learn and use, it may fail. Using theories and principles from software engineering and psychology, students learn to analyze usability requirements to improve user interface development.

CIS 8504: Network Technologies (3 s.h.) F S

Prerequisites: Satisfactory completion of the MS in IS & T Core courses, CIS 5105-07.

Focuses on the design, construction and use of modern networks and inter-networks, including Internet, intranet, firewalls, VPN, e-mail, and wireless technologies. Prepares students to successfully create and operate modern secure networks. Key concepts and technologies include LAN design and construction, Internet architecture, internetworking (with an emphasis on the Internet), WAN connectivity, firewalls, Application Layer protocols, virtual private networks, wireless and network operation in real-world environments.

CIS 8506 Software Engineering (3 s.h.) F S

Prerequisites: Satisfactory completion of the MS in IS & T Core courses, CIS 5105-07.

A project-based course focusing on current methodologies employed in software design and development. The core material covers the key components of software engineering, including requirements analysis, specification development, detailed design, program development, quality control (verification and validation), configuration management, testing, and post-development maintenance. Emerging software development techniques – security engineering, service-oriented architecture (SOA), and aspect-oriented development are also introduced.

CIS 8508 Enterprise Resource Planning Software (3 s.h.) F S

Prerequisites: Satisfactory completion of the MS in IS & T Core, CIS 5105-08.

Covers Enterprise Resource Planning (ERP) software and how it is used in large corporations. Students will study the basic functionality offered by common ERP software modules and how these modules interact with each other. They will learn about interfaces between internal systems and with external systems (eCommerce). By investigating the origins of ERP and its current state, students can understand how ERP is likely to change in the future. Group projects will provide students with some exposure to the ERP life cycle (e.g., requirements gathering, selecting a package, specifying customizations, and planning for software roll out). to implement extra functionality).

CIS 9110: Advanced Seminar in Information Science and Technology (3 s.h.) F S

Prerequisites: The MS in IS&T Core and at least 3 approved electives.

An advanced level graduate special topics course in current and emerging developments in the field of information systems and technology.

CIS 9995: Project in Information Science and Technology (3 s.h.) F S

Prerequisites: The MS in IS&T Core and at least 3 approved electives.

This is a required capstone elective course for the MS in IS&T program. It is designed to ensure that all MS in IS&T graduates have had a one semester group learning project experience implementing of an information system for an external client. In special, approved cases, special projects and/or a research paper may be substituted for the project. The course may be counted at most once toward the MS in IS&T degree.

Appendix B – Accelerated (4+1) Bachelors-Masters Degree (ABMD) Program Summary (11-12-2010)

The CIS Department is pleased to announce the immediate start of an AMBD with Masters program (CIS Department Accelerated 4+1 Bachelors/Masters Degree Program in Computer and Information Sciences) leading to a Bachelors degree in Computer Science (CS) or Information Science & Technology (IS&T) and a Master of Science in CS or IS&T.

The accelerated degree program will consist of a minimum of 114 semester hours of undergraduate course work, a maximum of 9 semester hours of graduate coursework to count towards both the undergraduate and the graduate degrees, and a minimum of 18 semester hours of additional graduate coursework for the graduate degree. Upon successful completion of the fourth year, students will receive a Bachelors degree in the CIS Department. At the end of the contiguous fifth year, students will receive a Master of Science in CIS. Students will complete the requirements for both degrees in five years.

The program can be tailored specifically to either CS or IS&T majors seeking either the BA or BS degrees. IS&T majors in the AMBD can complete the MS in IS&T degree in just one additional year; CS students can complete an MS in either CS or IS&T in just one additional year.

The ABMD is designed for high achieving Temple CIS undergraduate students interested in completing a Master of Science degree in Computer and Information Sciences in just one additional year of full-time study beyond the Bachelor's degree. The goal of the program is to encourage such students to complete their undergraduate work in a timely manner, and encourage them to remain at Temple for their Master's graduate work.

Applicants for the ABMD with Masters in CIS must have completed a minimum of 83 credits toward graduation with a cumulative GPA of 3.5 and a minimum of 39 Math/CIS credits to qualify for admission to the program. All students approved to enter the ABMD will have completed the equivalent of 6 full semesters of study at Temple. The undergraduate courses that must be completed are all courses from undergraduate CIS programs. Interested students must see the ABMD Program Coordinator (Dr. Friedman, frank.friedman@temple.edu) and their undergraduate advisor on a regular basis to ensure they are on the correct path for both timely admission to the ABMD with Masters in CIS and completion of the baccalaureate degree. The plan of study requirements leading up to the Senior year are tight, and there is not much room for error.

Approved applicants will begin the ABMD with MS in CIS program in the Fall (first semester) of their senior year. A completed ABMD application must be on file in the CIS Department by January 15th of the semester immediately preceding the Fall semester. No student will be admitted to the program unless the CIS department can verify that the applicant can complete the CIS Department CS baccalaureate degree in 2 semesters after enrolling in the program.

ABMD applicants must submit the following information.

- ABMD application
- A statement of goals of approximately 500-1,000 words (should include the following elements: your specific interest in Temple's program; your professional goals; and your academic and professional achievements)

- An up-to-date resume
- At least two letters of recommendation from Computer & Information Sciences faculty

ABMD participants are expected to have a completed Graduate School application (TOEFL and GREs are waived) on file with the Graduate School (including a fully paid fee) by November 1st of their senior year.

Students admitted to the ABMD with Masters in CIS are expected to complete the entire program within four contiguous semesters beginning with the first semester of their Senior Year. Students are expected to maintain full-time study status during the last two semesters of undergraduate studies and the additional year of the Master's program study. No undergraduate overloads (more than seventeen credits) will be allowed.

Students unable to complete the baccalaureate program of study with the required coursework or to maintain a 3.0 undergraduate grade point average or to earn at least B in each of the three graduate courses within the 2 semester time frame will be de-enrolled from the program. However, they may continue working toward the undergraduate degree and then apply for admission to the MS in CS or IS&T programs following the normal procedures of the Graduate School. Graduate courses taken as an undergraduate may be counted towards their graduate program.